TABLE 1.—*Clinical Characteristics of Patients on Captopril Therapy*

Case	Age, Years	Sex	Diagnosis	Heart Disease	Lung Disease	Captopril Dose, mg/d	Remarks
1 . . .	59	♂	Hypertension	No	No	75	No cough with β-blocker
2 . . .	25	♀	Hypertension	No	No	75	No cough with β-blocker
3 . . .	63	♂	Hypertension	No	No	100	No cough with β-blocker
4 . . .	56	♀	Cardiomyopathy	Yes	No	75	Dyspnea less with captopril

and inhibition of this enzyme would be expected to increase bradykinin levels in the lung.[1,10] This increase might affect the lung by directly inducing smooth muscle contraction, by promoting local edema or by irritating nerve endings. By stimulating phospholipase, bradykinin could augment formation of the arachidonic acid derivatives, prostaglandins and leukotrienes, which may be etiologically important in asthma,[1,11] and it may also directly affect release of histamine from mast cells, an action thus far shown, however, only in murine mast cells in vitro. Inhaling bradykinin can provoke bronchospasm, but only in patients with asthma[12]; none of the patients in the cases reported here had asthma.

In case 1, bronchial irritability is suggested by the exacerbation of cough by methacholine and its termination with the use of the β_2 agonist, terbutaline, during the methacholine challenge; by the unequivocal relief of cough with the administration of prednisone, and, perhaps, by his slight cough on labetalol therapy alone. At the height of his captopril cough, however, he was not short of breath with effort, had no physical signs of bronchospasm and spirography results were only slightly, if at all, positive for bronchospasm before or after methacholine challenge. Moreover, his cough while receiving a substantial dose of labetalol was mild and transient, whereas the captopril-associated cough had been insufferable; indeed, he had had no cough at all while taking propranolol, 320 mg daily. The patient in case 3 had no cough with substantial doses of both propranolol and nadolol, but a severe cough developed on two occasions with the use of captopril; his spirogram findings were also unimpressive. The patient in case 2 had no cough on an atenolol regimen of 50 mg a day.

A practical implication of this experience is that, in patients in whom cough develops while on captopril therapy, β-blockers need not be withheld on the presumption of provocable bronchospasm.

Cough due to captopril therapy is not common and is probably idiosyncratic. Its concurrence in father and daughter (cases 1 and 2), therefore, suggests a genetic determination.

Captopril may be easily overlooked as the cause of cough. In a patient with heart failure "unloaded" with captopril therapy, cough is likely to be ascribed to the failure itself and the drug therapy continued or even increased, as initially in the patient in case 4. In a hypertensive patient taking a β-blocker and captopril, cough is likely to be attributed to the β-blocker, as in case 1, or to occult heart failure, whereupon the captopril dose might be increased.

Prospective studies can establish how often captopril causes cough, which patients are likely to get it, the role of dose and possibly even the cause. Such studies are feasible because this excellent drug is often used and cough, when it occurs, does so soon after starting captopril therapy and subsides promptly on stopping it.

Addendum

Since this report was submitted, three other cases of captopril-induced cough have come to my attention. The first was of a 70-year-old woman with hypertension in whom a severe cough without dyspnea or wheezing promptly developed with the use of captopril, 50 mg per day, and whose cough completely disappeared two days after stopping the therapy several weeks after beginning it. The second case was of a 72-year-old woman with hypertension and ischemic heart disease complicated by mild congestive heart failure and mild mitral regurgitation who, in 1982, while receiving an unknown dose of captopril, had a cough develop that cleared completely five days after the drug therapy was stopped. In November 1984, after captopril therapy was resumed at 75 mg daily, a cough developed that disappeared a few days after she stopped taking the drug. The third patient, a 63-year-old woman with hypertension and a questionable history of asthma, had the development of an annoying cough without dyspnea on a regimen of captopril, 75 mg daily. The cough cleared over a two-week period after stopping the regimen; she is currently under investigation for airways disease.

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Stress-Induced Cessation of Lactation

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ANECDOTAL REPORTS of abrupt cessation of lactation due to psychological stress are well known in folk experience. In this paper I describe the cases of two women who had abrupt cessation of lactation and of colostrum excretion, respec-

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tively, following the psychological stress experience of the 1985 Mexico City earthquake.

Reports of Cases

Case 1

The patient, a 24-year-old woman, was examined 12 days after the earthquake occurred in 1985. She was gravida 3, para 3. Her 3-month-old infant girl was being exclusively breast-fed by the patient. She had been successful in breast-feeding her 5- and 3-year-old sons until the ages of 14 and 18 months of age, respectively. The mother stated that early on the morning of September 19, 1985, she walked to the market located three blocks from her address, leaving her children at home unattended. At 0718 hours, the Mexican earthquake struck and part of the market's roof came down and injured several people. She became frightened and concerned for the safety of her children and ran to her house. On her way she saw several demolished buildings and she heard the cries of the injured, which further distressed her. On arriving at her house, she found all the children crying but unharmed and her home intact. She attempted to nurse her infant girl but, to her surprise, did not have the usual sensation of the "let-down reflex." The infant was not able to obtain milk in spite of vigorous nursing. The infant continued to cry and further attempts at nursing throughout the day failed to pacify her. Later in the day the mother procured a commercial milk formula to nourish her infant. Further breast-feeding attempts for the next week did not produce milk. She described herself as being "very nervous and upset" since the day of the earthquake. No abnormalities were noted on physical examination. Expression of her breasts failed to produce milk.

Case 2

The patient, a 35-year-old gravida 4, para 3 woman, was examined 16 days after the earthquake occurred. She presented to the clinic on the 39th week of gestation due to her concern of possibly being unable to breast-feed her unborn infant. She had breast-fed her previous three children successfully beyond the first year of life. Her current pregnancy had been uneventful and, as in previous gestations, she noted spontaneous copious discharges of colostrum throughout the last couple of months before delivery. In this pregnancy, the colostral discharge was also abundant, requiring her to wear padding in her bra to prevent wetting of her clothing.

On the morning of September 19, 1985, at about 0645 hours, her husband and her 8- and 6-year-old children left home, and she was left with her 3½-year-old daughter. At 0718 hours the earthquake occurred, seriously damaging her home. One of the rooms was completely destroyed. Several falling bricks struck her on the right arm, causing ecchymosis and abrasions; her daughter was unharmed. They ran outside their house where she saw a several-story high apartment house that was completely demolished. She did not know whether or not her husband and other children were safe until several hours later; they were unharmed. Her younger sister and husband had died when their apartment collapsed. Since that day, she and her family have been housed at another sister's three-bedroom apartment, which was also being shared with another family, for a total of 15 people.

On the day of the earthquake, the patient noted that the padding in her bra was not wet. She has not noted leaking of colostrum since that time. She has suffered from insomnia, anorexia and nervousness. Findings of a physical examination were normal for a woman at term gestation. Expressing the breast yielded only a few drops of colostrum bilaterally.

Comment

Lactation in a normal woman is under the control of various reflexes, including the nipple erection reflex with tactile and psychogenic components, the prolactin reflex mediated through the cortical-hypothalamic influence on the anterior pituitary secretion of prolactin and, finally, the let-down reflex, which is mediated via nipple stimulation and psychogenic factors. The cortical pathways act on the paraventricular nucleus of the hypothalamus and subsequent posterior pituitary secretion of oxytocin. Prolactin facilitates the filling of the breast with milk, and oxytocin activates the contraction of the myoepithelial breast alveoli "basket cells," filling the terminal lactiferous ducts and resulting in the ejection of milk.[1]

The two women in this report clearly had abrupt cessation of milk and colostrum secretion, respectively, immediately following the major psychological stress caused by the earthquake experience. The initial failure of the let-down reflex on the lactating women was followed by further stress caused by the frustrating experience of a hungry, dissatisfied, crying infant. The pregnant mother near term, who, as in previous gestations, was leaking colostrum, noted that its secretion ceased abruptly for at least 16 days after the catastrophe when the examination took place. This woman's stress was prolonged by her grief reaction to the death of her sister and the crowded living conditions. Unfortunately, I do not have any information on the outcome of lactation after delivery.

Tension, fear, discomfort or embarrassment can inhibit the milk ejection reflex of lactating women.[2] Veterinarians are aware of the inadequate lactation or failure of the let-down reflex on stressed cows,[3,4] and the same phenomenon has been observed in laboratory animals.[5,6] Stress inhibition of oxytocin secretion is believed to be mediated centrally through neurohumoral, noradrenergic, cholinergic and dopaminergic mechanisms.[7-9] Dopaminergic effect also suppresses prolactin secretion (prolactin inhibitor factor).[10] Stress-related inhibition of the milk ejection reflex might also result from peripheral α- and β-adrenergic effects. α-Stimulation causes vasoconstriction in the breast area that prevents oxytocin access to the mammary myoepithelial "basket cells." The β-receptor stimulus dampens the myoepithelial action and increases the tonicity of the mammary ducts.[11,12]

Cessation of spontaneous colostrum secretion observed in the pregnant woman was probably not due to lack of the lactogenic hormone. The placenta supplies prolactin during the last trimester of gestation. The mechanism may be related to oxytocin or local α- and β-adrenergic effects in the breasts, or both.

These cases illustrate the role that psychological factors play in lactation; stress appears to hinder the production of milk. The mother requires a stable, calm environment for successful lactation, as well as supportive, empathic spouse, family and physician.

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Peripartum Cardiomyopathy—Successful Treatment With Cardiac Transplantation

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MANY CASES and studies of peripartum cardiomyopathy have been reported but the etiology and natural course remain unknown. The first description of this disorder was made by Ritchie in 1849 and, based on Meadows's description in 1960, it has also been known as "Meadows's syndrome."[1] Subsequently the disorder has been characterized on clinical, hemodynamic and histologic bases, but a diagnosis remains one of exclusion. The disorder apparently affects less than 1% of all patients suffering cardiac diseases of pregnancy, but it is associated with significant fetal (10%) and maternal (30% to 60%) mortality.[1,2] Peripartum cardiomyopathy affects women during the last trimester of pregnancy and during the early postpartum period; therefore, the name "peripartum" (as opposed to "postpartum") cardiomyopathy is most appropriate.

The criteria for diagnosis include the development of heart failure during the last month of pregnancy or during the first three to six postpartum months, absence of other causes of heart failure and absence of any heart disorder before the last month of pregnancy.[3-6] The clinical course of the disease is quite variable and severity appears to be indicated by whether or not the heart size returns to normal within six months.[5,6] Although pathologic findings are similar, patients whose heart size does not return to normal have a greater morbidity and mortality than those whose heart size does return to normal. The outcome of subsequent pregnancies was also poorer in the former group.[4,5]

The following case report shows some of the serious potential complications experienced by a woman with peripartum cardiomyopathy. Her course is one of rapid decline ending in morbid congestive failure, which necessitated an orthotopic heart transplantation. She is currently convalescing well without adverse consequences.

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Report of a Case

The patient, a 27-year-old woman who was gravida 2, para 2, was admitted to 5th General (US Army) Hospital, Stuttgart, West Germany, seven days after normal spontaneous vaginal delivery of a healthy male infant. She complained of fever, chills, nausea, vomiting and subsequent increased vaginal bleeding. She also noted a progressive shortness of breath beginning about 48 hours before admission.

The patient had been delivered of her first child 12 months previously, and both pregnancies were normal. During the second pregnancy, however, she was noted to have rare multifocal, premature ventricular contractions on routine and 24-hour ambulatory electrocardiograms (ECGs). Physical examination during her early third trimester revealed no definitive heart disease; no antiarrhythmic drugs were used, and the patient was followed until delivery with no development of complications. She specifically said she did not have any symptoms of congestive heart failure. She had no significant past medical history; indicated no use of alcohol, cigarettes or illicit drugs, and reported no hypertension, toxin exposure or peripartal illness. Family history revealed that her mother had a myocardial infarction at age 53. The patient's predelivery weight was 61 kg (134.5 lb).

On admission to the hospital, a physical examination initially elicited clear lung sounds, and no cardiac abnormality was noted. Temperature was 38°C (100.4°F), blood pressure 100/70 mm of mercury supine and respirations 30 per minute, with a heart rate of 100 per minute. On pelvic examination her uterus was soft, nontender and she had normal adnexa. Hematocrit was 35%, leukocyte count was 16,000 per μl with 30% band forms and platelets were 106,000 per μl. Electrolyte values were normal, blood urea nitrogen level was 16 mg per dl and creatinine level was 1.2 mg per dl. She was placed on a regimen of ampicillin, gentamicin sulfate and clindamycin (Cleocin) hydrochloride for presumed endometritis.

Twelve hours after admission increased shortness of breath developed, with bibasilar rales, greatly elevated jugular venous pressures, hepatojugular reflux and facial plethora. On cardiac examination she had normal first and second sounds, with third and questionably fourth heart sounds heard. There were no murmurs. The abdomen was soft, but with guarding in lower abdominal segments. The extremities did not show cyanosis or edema. A chest x-ray film revealed an increased cardiothoracic ratio, a cephalized vascular pattern and interstitial edema. An ECG showed nonspecific ST-T-wave changes that were unchanged from those during pregnancy; there was no ectopy. A suboptimal echocardiogram showed a small pericardial effusion but no mural thrombosis. A Swan-Ganz catheter was placed in the right side of the heart, with pressures as follows: right atrium 20 mm of mercury, pulmonary artery 51/38 mm of mercury with a mean of 40, pulmonary capillary wedge pressure 23 mm of mercury, cardiac output 3.1 liters per minute (cardiac index 1.92 liters per minute · m^2); systemic vascular resistance was 1,560 dyne seconds · cm^{-5}, and pulmonary vascular resistance was 440 dyne seconds · cm^{-5}. The blood pressure was 100/60 mm of mercury.

The patient was treated with inotropic agents given